

Social adversity and mental functions in adolescents at high risk of psychopathology*

Position paper and suggested framework for future research

IAN M. GOODYER

Background Social adversities are accepted as critical factors in the development of psychopathology in young people, but the precise mechanisms of this relationship are unknown.

Aims To explore sources of evidence and suggest future lines of research to clarify the relationship between exposure to negative circumstances and development of psychopathology in young people.

Method Selective survey of the literature to collect a series of hypotheses that might serve as a framework for future research.

Results and conclusions Evidence to date suggests there is no simple relationship between adverse life events and the subsequent emergence of psychopathology. The interplay of acute and chronic stressors over the lifespan with affective temperament; the interrelationship of 'sensitivity' and 'performance' cognitions in response to life events; and limbic-cortical neural networks are all indicated as important avenues of future research.

Declaration of interest None. I.M.G. is supported by the Wellcome Trust and this review was carried out within the MRC Cooperative for Brain, Behaviour and Neuropsychiatry.

During adolescence, onset of emotional disorders may be fast (days or weeks) or slow (months or years) depending in part on the nature of social adversities. What the exact negative psychological effects are, and why time to onset varies following exposure to negative circumstances, remain almost entirely unknown. An important assumption is that events and difficulties carry a latent and undesirable psychological construct (such as personal threat or negative impact to the self) that can be inferred from a detailed recall of the social characteristics of the experience. Recent advances in neuroscience have opened up possibilities for characterising in a more direct way the intermediate mental and neural processes responsible for organising behavioural responses to different forms of adversity. Coping with social risks may depend on there being a sequential set of mental processes involving emotion recognition, appraisal of the implications for the self, and initiation of control processes that determine the form of behavioural response.

Determining the causation of common emotional and behavioural disorders in young people requires an extension of current social inquiry interview procedures to characterise the neurocognitive processes through which life events and difficulties exert their effects. It is suggested that this can be achieved by incorporating experimental methods of assessing psychological functions and mapping these to neural systems underpinning these functions at different stages of development. Putative intermediate neurochemical systems will not be discussed, although it is acknowledged that their modulating effects may shape the structure and function of the social and emotional brain over time (Goodyer *et al*, 2001).

A tentative theoretical framework for further research is proposed, based on some selected illustrations from findings on affective disorders in young people as well as

data from studies on adults. Although primarily focused on affective disorders, the framework has implications for life events research in behavioural syndromes as well.

LIFE EVENTS AS CAUSAL PROCESSES IN PSYCHOPATHOLOGICAL CHANGE

Both long-standing and recent social adversities precede and increase the risk for emotional and behavioural psychopathology during the school-age years (Goodyer *et al*, 2000; Sandberg *et al*, 2001). Such negative experiences, while independent of the symptoms of illness, may be dependent in part on the young person's own actions. In a prospective study of adolescents (Goodyer *et al*, 2000), no specific combination of long-term or recent family difficulties, marital problems, life events or temperamental predispositions in the adolescent predicted onset, indicating that these adverse environments (although necessary) are rather non-specific antecedent correlates of disorder. Exposure to acute severe personal disappointment or permanent loss 1 month before onset adds significantly to the liability for subsequent disorder. Disappointments, defined as a failure to meet previously held expectations about a forthcoming social experience, were focused in the main on peer-group activities. Despite this improvement in predicting onset, in nearly 50% of subsequent cases the person was not exposed to such a highly proximal undesirable experience. This suggests that the notion of a causal two-stage model of acute on chronic adversities occurring in adolescents with temperamental difficulties is not necessary in a substantial proportion of first-episode cases.

Martha Rueter and colleagues (Rueter *et al*, 1999) investigated the interdependence between persistent parental disagreements and psychiatric symptoms in 13-year-old adolescents over a period of 4 years, and re-interviewed the young people at 19–20 years of age for assessment of emotional disorders. The direct predictors of disorder at age 19–20 years were higher self-reported depression scores at age 13 years and rising depression scores over the subsequent 3 years, the two being correlated. Interestingly, parental disagreements at each year point did not directly

*The Rutter Lecture; delivered at the Faculty of Child and Adolescent Psychiatry Residential Conference, University of York, 5 October 2001.

predict onset but were crucial moderators of the change in depression scores over time. Increases in parental disagreements correlated with increases in self-reported depressive symptoms. Thus, chronic parental disagreements appear to be slow but relentless producers of depressive symptoms leading to subsequent later clinical disorder. Whether highly specific proximal life events involving peers would have altered the nature of these relationships is not clear, as these were not independently measured. It may also be that social inquiry methods underrecorded important private events such as intrafamilial physical and sexual abuse, which are particularly likely to be correlated with subsequent psychopathology. Such experiences could be embedded in the broader non-specific category of family discord. Nevertheless, these longitudinal observations suggest an evolving psychosocial process over mid-adolescence exerting significant effects on onset of anxiety and depressive disorders by late adolescence.

Overall, throughout the main adolescent period of risk of affective disorders there appears to be both a fast and a slow pace of onset for first-episode unipolar major depression. Both types seem likely to arise from the same broad set of family risk environments within which a greater understanding of the effects brought about by physically and sexually abusive events is essential. Fast-onset affective disorder appears to be rapidly induced in many teenagers by a highly toxic and rather specific event involving acute peer-group dysfunction or (less commonly) severe loss. If there is not a rapid effect, it looks as though negative life events contribute as further 'slow burn' experiences, increasing the liability to onsets evolving by early adult life. Fast-onset events are not specifically associated with a highly emotional temperament: thus, serious disappointments appear to arise more from the ebb and flow of normal adolescent peer-group relations than individual differences in behavioural style.

What precise pathological psychological effects occur within people following exposure to adverse life experiences remains unclear. Investigating this question requires more direct assessment of the mental functions of adolescents who have experienced different types and patterns of personally negative events and difficulties over time.

THE NATURE OF MENTAL FUNCTIONS

Mentality can be considered within two broad domains: sensitivity and performance. Sensitivity can be defined as functions that are open and responsive to environmental stimuli. These include recognising emotions both in the self and in others; putting oneself in other people's shoes; and recalling experiences that are contextually relevant to the immediate environment, evaluating their meaning and subsequently forming possible response behaviours. Performance can be defined as abilities that are required to carry out task-specific actions. They are crucial for organising thoughts and for the control of behavioural responses, and are commonly referred to as executive functions. These processes allow performance to be optimised in complex situations and include planning, attentional flexibility, inhibiting undesirable behavioural responses, and decision-making ability.

The sensitive mind and social adversity

Aaron Beck postulated that affective disorders arise from a set of negative cognitive self-schemas whose origins and formation occur following exposure to adverse early experiences (Beck, 1967). He suggested that these are latent and not accessible to consciousness, until activated by subsequent negative social experiences. Under such circumstances individuals will experience dysphoric mood and, if they possess a negative latent schema, will consciously experience a clinically impairing level of self-devaluative thoughts. Over the past two decades increasing evidence has noted that dysphoric mood is a critical activating factor, as negative latent schemas are not present in neutral mood alone. There is therefore a crucial distinction to be made between emotionally 'cold' and 'hot' cognitive processes (Teasdale & Barnard, 1993; Teasdale *et al.*, 1998). Cold cognitions are thoughts about the self that are conscious, intellectual and considered without associated affect. Hot cognitions are those in which affective tone is an integrated component of the thoughts. It is the latter form that appears to be more characterised by an increase in the number of self-critical, blaming and derogatory comments. This suggests that it is the activated emotional mode that might be a

distinctive indicator of abnormalities of sensitive mind evolving as a consequence of social adversity. Whether in young people hot cognitions of this type are captured to a sufficient degree by self-reports of cold cognitive measures such as self-esteem is unclear. Three modes of processing emotional material have been proposed: 'mindless emoting'; 'conceptualising/doing' and 'mindful experiencing' (Teasdale, 1999). It is the latter mode that is postulated as the only way to process negative emotion effectively. Whether these three forms of emotion-processing are truly independent and associated with different types of social experiences – good or bad – is not known.

Negative self-schemas, temperament and social adversity in adolescents

Kelvin and colleagues have established that latent negative schemas exist in normal adolescents with no previous lifetime history of psychopathology (Kelvin *et al.*, 1999). Activation of dysphoric mood-congruent self-devaluative thoughts (hot cognitions) was specifically associated with the enduring temperamental style (present for at least 3 years) of high emotionality in both genders. This association was neither a function of the level of induced dysphoria nor associated with mean scores of self-reported current depressive symptoms or self-esteem (cold cognitions), suggesting that emotion-focused cognitions are different from those obtained in self-reports of mood and feelings. A significant association between negative maternal experiences during infancy and dysphoric congruent self-devaluative thinking in 5-year-old children during a hot cognitive task has also been reported (Murray *et al.*, 2001). The findings from these two studies suggest critical interplays might occur between temperamental vulnerabilities and adverse social environments during development that predispose to evolving negative affective-cognitive schemas from middle childhood through adolescence. It may be that there is a temperamental predisposition within the child for the inception of latent negative cognitive schemas whose formation is dependent on subsequent ongoing family adversity. The corollary is that there might be a decreased tendency to form negative affective-cognitive schemas following exposure to

such adversities in those who are not temperamentally at risk.

The performing mind and coping with life events

Ruminating on dysphoric congruent self-devaluative thinking has been proposed as the psychological element that results in persistence of self-devaluative thoughts in consciousness through a failure to process dysphoria (Nolen-Hoeksema & Morrow, 1993). Rumination may indicate an active strategy engaged to avoid emotionally painful experiences. If so, there is a clear cost in terms of narrowing cognitive flexibility, at least in the short term. Alternatively, this ruminative process might implicate a putative role for performance weaknesses in emotion processing and coping with the psychological consequences of social adversity. If some adolescents have weaknesses in cognitive control processes, then modulating the mood-congruent effects of undesirable life events and difficulties might be inefficient and lead to impaired coping with environmental demands. Remarkably little is known about the putative role of executive processes involved in coping with social adversity, although neuropsychological impairments in depression have attracted considerable research interest (Austin *et al.*, 2001). Thus, the following account is tentative and is aimed at generating hypotheses for further investigation.

Coping refers to a collection of internal responses to external events whose functions are to ameliorate the liability to distressful outcomes. A number of distinct processes contribute to adequate coping, including problem-solving ability, controllability of the situation and appraisal of circumstances. Although there is considerable interest in children's ability to information-process social experience, how psychological coping strategies are activated following exposure to life events has received little research attention. A preliminary investigation of these relations has been carried out using a case-control sample of 30 recently depressed adolescents and 48 control participants matched for age, gender and general intelligence, who took part in a series of evaluations documenting concurrently their social coping and executive skills. Participants were first asked to recall and describe an undesirable life event and then complete a self-report

coping questionnaire recording how they would expect to respond to that specific circumstance (Kyte, 2002). The instrument measured four styles of coping: active, distraction, avoidance, and seeking support (Ayers *et al.*, 1996). Participants then completed selected tests of cognitive performance covering three processes considered likely to be recruited when organising an event-driven response: flexibility of attention, behavioural inhibition and decision-making (Sahakian & Owen, 1992). For active and distraction coping styles there were moderate and strong associations with behavioural inhibition and decision-making abilities, respectively, in both case and control groups, but no association with flexibility of attention in either group. These associations were strongest for adolescents who recalled personal disappointments or losses. Avoidant coping was more prevalent among participants with depression when recalling any form of undesirable life event, and these individuals were also less efficient in both the behavioural inhibition and decision-making tasks. These cross-sectional patterns in adolescents with depression suggest not only potential performance differences that might be a consequence of psychopathology, but a loss of connection between coping and executive skills, which is retained by members of the control group. It is not yet known whether executive performance varies with temperamental style, but negative emotionality is associated with the pattern of children's coping style following divorce (Lengua *et al.*, 1999). Adverse experiences may therefore exert greater negative influence on the nature of mental performance than has been considered hitherto, a possibility that is also suggested by recent longitudinal findings that the offspring of women with postnatal depression show significant deficits in general cognitive abilities in the subsequent childhood years (Hay *et al.*, 2001). Whether these effects are mediated by a negative temperamental style or by physiological processes (such as changes in neurochemical performance) requires further research.

MENTAL COHERENCE TO SOCIAL ADVERSITY

When healthy adolescents are exposed to an undesirable life event or difficulty, a complex series of psychological functions

may be brought into play in order to effect an adaptive response. I suggest that this is likely to involve activation of components of both the sensitive and the performing mind. Four interconnected psychological steps are hypothesised:

- (a) processing the immediate emotion response;
- (b) evaluating the salience of the experience through appraisal and matching with recalled past experiences;
- (c) organising a mental strategy for responding to this mnemonic process through parallel activation of (at least) decision-making and behavioural inhibition;
- (d) synchronising the operation of the aforesaid mental functions to reduce the risk of negative effects on the self.

What seems crucial is that this proposed model for processing social experience operates most effectively when the mind is emotionally 'hot'. This makes efficient emotion processing a key first step of the overall response to social adversity.

If the findings to date are treated as hypothesis-generating, then the level of psychiatric risk following exposure to undesirable life events and difficulties might be related to one or more of three intermediate cognitive endophenotypes: oversensitive response to the associated emotional tone of the experience; weak control functions, allowing for a disorganised behavioural response; and failure of overall mental integration such that sensitive and control processes lack synchrony. Who might be most liable to these processing weaknesses? Adolescents at high psychosocial risk of psychopathology are likely candidates, perhaps specifically those with latent negative schemas themselves derived from earlier adverse experience.

Prospective studies need to determine the concurrence and coherence of sensitive and performance mental functions in both 'cold' and 'hot' cognitive states through the developmental period of adolescence. This is likely to require the incorporation of challenge or demand paradigms in study designs and the relation of these to the nature of both recent and past social adversities. This methodological issue is clinically as well as theoretically relevant, as choice of treatment may depend not only on the clinical features and social environment but also on the characteristics of sensitive and performance mental functions – the psychological endophenotype.

THE NEURAL BASIS OF PSYCHOLOGICAL RESPONSE TO LIFE EVENTS

If impaired processing of life events results in measurable affective–cognitive deficits then there should be parallel disruption in the functional neural networks underpinning these processes. Thus, in healthy adult volunteers, the induction of dysphoric mood and concurrent thinking about personally salient negative events (i.e. ‘hot’ affective–cognitive processing) result in the differential activation of a definable limbic-cortical loop. Different components of this network may be distinctively responsible for the psychology of emotion recognition, cognitive appraisal and behavioural response to social adversity, as well as synchronising the coherence of this complex process. Recognising the emotional tone of a social experience is associated with activity primarily in the amygdala (Calder *et al.*, 2001; Thomas *et al.*, 2001). Processing affect-related meanings of life events appears to be mediated by the medial prefrontal cortex functioning as the executive component for limbic-cortical activity (Teasdale *et al.*, 1999). The neural basis for evaluating, organising and consolidating the meaning of environmental stimuli in declarative memory is a function of the hippocampus (Eichenbaum, 1999), whereas the orbital prefrontal cortex appears preferentially associated with establishing the degree of difficulty of inductive inference from external stimuli (Goel & Dolan, 2000).

Although the basic programming of these neural networks is genetic, the fine-tuning most probably occurs through social experience in childhood and adolescence (Paus *et al.*, 2001). Animal studies have shown deleterious consequences of social stress on neural structure and function, implicating an effect of the social environment on brain through the physiological consequences of persistent interpersonal difficulties (McEwen, 1998). Determining the relative effects of chronic and recent life events and difficulties on the patterning of psychological functions and their related neural structures is a major goal of future developmental research. Such vertically integrated science will provide important clues about the interplay between social experiences, mental processes and their neural substrates (Posne & Rothbart, 2000).

IAN M. GOODYER, MD, FRCPsych, FMedSci, Developmental Psychiatry Section, Department of Psychiatry, Cambridge University Clinical School, Douglas House, 18b Trumpington Road, Cambridge CB2 2AH, UK

(First received 6 December 2001, final revision 7 May 2002, accepted 9 May 2002)

The clinical implications of such research could be far-reaching. They include identifying socially at-risk populations by their psychological and neural patterns of response to different life event tasks both off-line (outside of the scanning environment) and on-line (using functional magnetic resonance); understanding the nature of developing neurocognitive systems following exposure to different patterns of social adversity through childhood and adolescence; delineating weaknesses and deficits in different components of the limbic-cortical circuit, thereby opening the opportunity for new targets for treatment; and documenting neurocognitive change in patients following treatment.

ACKNOWLEDGEMENTS

I.M.G. is supported by a Wellcome Trust Programme Grant and a project grant from the PPP Foundation. This paper was completed within the MRC Co-operative on Brain, Behaviour and Neuropsychiatry.

REFERENCES

- Austin, M.-P., Mitchell, P. & Goodwin, G. M. (2001)** Cognitive deficits in depression. Possible implications for functional neuropathology. *British Journal of Psychiatry*, **178**, 200–206.
- Ayers, T., Sandler, I., West, S., et al (1996)** A dispositional and situational assessment of children's coping. *Journal of Personality*, **64**, 923–958.
- Beck, A. (1967)** *Depression: Clinical Experiments with A Theoretical Aspect*. New York: Harper & Rose.
- Calder, A., Lawrence, A. D. & Young, A. W. (2001)** Neuropsychology of fear and loathing. *Nature*, **2**, 351–363.
- Eichenbaum, H. (1999)** The hippocampus and mechanisms of declarative memory. *Behavior and Brain Research*, **103**, 123–133.
- Goel, V. & Dolan, R. J. (2000)** Anatomical segregation of component processes in an inductive inference task. *Journal of Cognitive Neuroscience*, **12**, 110–119.
- Goodyer, I. M., Herbert, J., Tamplin, A., et al (2000)** First-episode major depression in adolescents. Affective, cognitive and endocrine characteristics of risk status and predictors of onset. *British Journal of Psychiatry*, **176**, 142–149.
- , **Park, R. J., Netherton, C. M., et al (2001)** Possible role of cortisol and dehydroepiandrosterone in human development and psychopathology. *British Journal of Psychiatry*, **179**, 243–249.
- Hay, D., Pawlby, S., Sharp, D., et al (2001)** Intellectual problems shown by 11 year old children whose mothers had postnatal depression. *Journal of Child Psychology and Psychiatry*, **42**, 871–899.
- Kelvin, R. G., Goodyer, I. M., Teasdale, J. D., et al (1999)** Latent negative self-schema and high emotionality in well adolescents at risk for psychopathology. *Journal of Child Psychology and Psychiatry*, **40**, 959–968.
- Kyte, Z. (2002)** *Social Coping and Executive Function in Adolescents With and Without a History of Major Depression*. PhD dissertation, Department of Psychiatry, Cambridge University, UK.
- Lengua, L. J., Sandler, I. N., West, S. G., et al (1999)** Emotionality and self-regulation, threat appraisal, and coping in children of divorce. *Development and Psychopathology*, **11**, 15–37.
- McEwen, B. S. (1998)** Stress, adaptation, and disease. Allostasis and allostatic load. *Annals of the New York Academy of Sciences*, **840**, 33–44.
- Murray, L., Woolgar, M. & Cooper, P. (2001)** Cognitive vulnerability to depression in 5 year old children of depressed mothers. *Journal of Child Psychology and Psychiatry*, **42**, 891–899.
- Nolen-Hoeksema, S. & Morrow, J. (1993)** Effects of rumination and distraction on naturally occurring depressed mood. *Cognition and Emotion*, **7**, 561–570.
- Paus, T., Collins, D. L., Evans, A. C., et al (2001)** Maturation of white matter in the human brain: a review of magnetic resonance studies. *Brain Research Bulletin*, **54**, 255–266.
- Posne, M. I. & Rothbart, M. K. (2000)** Developing mechanisms of self-regulation. *Development and Psychopathology*, **12**, 427–441.
- Rueter, M. A., Scaramella, L., Wallace, L. E., et al (1999)** First onset of depressive or anxiety disorders predicted by the longitudinal course of internalizing symptoms and parent-adolescent disagreements. *Archives of General Psychiatry*, **56**, 726–732.
- Sahakian, B. & Owen, A. (1992)** Computerised assessment in neuropsychiatry using CANTAB. *Journal of the Royal Society of Medicine*, **85**, 399–402.
- Sandberg, S., Rutter, M., Pickles, A., et al (2001)** Do high-threat life events really provoke the onset of psychiatric disorder in children? *Journal of Child Psychology and Psychiatry*, **42**, 523–532.
- Teasdale, J. D. (1999)** Emotional processing, three modes of mind and the prevention of relapse in depression. *Behaviour Research and Therapy*, **37** (suppl. 1), S53–S77.
- & **Barnard, P. J. (1993)** *Affect, Cognition and Change: Remodelling Depressive Thought*. Hillsdale, NJ: Lawrence Erlbaum.
- , **Lloyd, C. A. & Hutton, J. M. (1998)** Depressive thinking and dysfunctional schematic mental models. *British Journal of Clinical Psychology*, **37**, 247–257.
- , **Howard, R. J., Cox, S. G., et al (1999)** Functional MRI study of the cognitive generation of affect. *American Journal of Psychiatry*, **156**, 209–215.
- Thomas, K., Drevets, W. C., Whalen, P., et al (2001)** Amygdala response to facial expressions in children and adults. *Biological Psychiatry*, **49**, 309–316.